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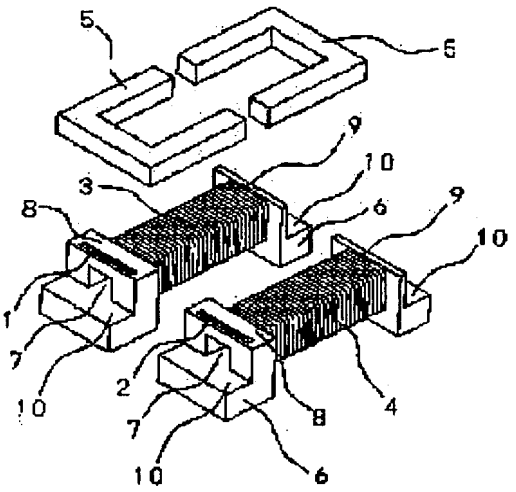
(71)Applicant : HITACHI FERRITE ELECTRONICS LTD
(72)Inventor : ISHIWAKI MASAO

(54) HIGH-VOLTAGE TRANSFORMER

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a high-voltage transformer which hardly causes discharge accidents and can be reduced in size.
SOLUTION: In a high-voltage transformer, a plurality of secondary coils 3 and 4 which commonly use magnetic fluxes generated from primary coils 1 and 2 are wound in the opposite directions and connected in parallel with each other. Major magnetic circuits are formed of soft ferrite cores and the secondary coils 3 and 4 are arranged at different positions in the circumference of the cores.



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CLAIMS

[Claim(s)]
[Claim 1] The high-pressure transformer characterized by carrying out parallel connection of two or more secondary coils which share the common magnetic circuit arranged in a mutually different location.
[Claim 2] Two or more secondary coils arranged in a mutually different location are high-pressure transformers characterized by the low voltage edge to which each low voltage edges of two or more of these secondary coils were connected to, and each high-pressure edges of two or more of these secondary coils were connected to, and the above was connected, and the high-pressure edge serving as a secondary output terminal while sharing the magnetic flux produced with the primary coil.
[Claim 3] Two or more secondary coils which share the magnetic flux produced with the primary coil are high-pressure transformers characterized by for the low voltage edges of each secondary coil approaching, and for the high-pressure edges of each secondary coil approaching, and being arranged.
[Claim 4] For at least one place, two or more secondary coils which share the magnetic flux produced with the primary coil are high-pressure transformers according to claim 1 to 3 characterized by the winding direction of an adjoining secondary coil being mutually reverse.
[Claim 5] Two or more secondary coils which share the magnetic flux produced with the primary coil are high-pressure transformers according to claim 1 to 4 characterized by being monolayer regular winding respectively.
[Claim 6] Two or more secondary coils which share the magnetic flux produced with the primary coil are high-pressure transformers according to claim 1 to 4 characterized by being the multilayer structure of monolayer regular winding.
[Claim 7] Two or more secondary coils which share the magnetic flux produced with the primary coil are high-pressure transformers according to claim 1 to 6 characterized by being respectively wound around the coil bobbin.
[Claim 8] The high-pressure transformer according to claim 1 to 7 by which a main magnetic circuit is characterized by being formed by the software ferrite core.
[Claim 9] The high-pressure transformer according to claim 1 to 8 by which a main magnetic circuit is characterized by being formed by the NiZn system ferrite core.
[Claim 10] The high-pressure transformer according to claim 1 to 8 by which a main magnetic circuit is characterized by being formed by the NiCuZn system ferrite core.
[Claim 11] The high-pressure transformer according to claim 1 to 8 by which a main magnetic circuit is characterized by being formed by the MgZn ferrite core or the MnMgZn ferrite core.
[Claim 12] The high-pressure transformer according to claim 1 to 11 characterized by forming the main magnetic circuit by the RO character type software ferrite core.
[Claim 13] The high-pressure transformer according to claim 1 to 11 characterized by forming the main magnetic circuit by the software ferrite core of two or more U character molds.
[Claim 14] The high-pressure transformer according to claim 1 to 11 characterized by forming the main magnetic circuit by the software ferrite core of two or more EE molds.
[Claim 15] The high-pressure transformer according to claim 1 to 11 characterized by forming the main magnetic circuit by the software ferrite core of one U character mold or an easy mold.
[Claim 16] The high-pressure transformer according to claim 1 to 11 characterized by forming the main magnetic circuit by the L character mold or the I-shaped software ferrite core.
[Claim 17] The high-pressure transformer according to claim 1 to 11 characterized by forming the main magnetic circuit combining two or more kinds in a L character mold, a T character mold, and an I-shaped software ferrite core.

[Claim 18] The high-pressure transformer according to claim 1 to 11 characterized by forming the main magnetic circuit by the software ferrite core of UI mold or EI mold.
[Claim 19] It is the high-pressure transformer according to claim 1 to 18 characterized by forming this a part of soft ferrite so that the cross section of a magnetic path may turn into 2/3 or less area of the average cross section while a main magnetic circuit is formed by the software ferrite core.
[Claim 20] the cross section of the above [the coil of a primary coil / the field] mainly -- smallness -- the high-pressure transformer according to claim 19 characterized by having been arranged so that it may be impressed by the part.
[Claim 21] A high-pressure transformer is a high-pressure transformer according to claim 1 to 20 characterized by being laid under the insulating resin and applied to the transformer for high-pressure generating for metal halide lamps.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention especially relates to the high-pressure transformer or coils for electric-discharge lamps, such as metal halide and a mercury lamp, about the transformer for high-voltage generating or coil used for a high intensity discharge lamp (it is also called a HID lamp).
[0002]
[Description of the Prior Art] For example, the high voltage is required when starting electric-discharge lamps, such as a metal halide lamp. In using it especially as a headlight of an automobile, in order to secure the restart nature immediately after putting out lights, the high-pressure transformer which can generate high starting voltage especially is needed.
[0003] As a conventional technique which meets such a demand, there is JP,8-130127,A shown in drawing 12 , for example. The conventional magnetic circuit is formed with one cylindrical core 105 so that drawing 12 may see. Moreover, around said one cylindrical core 105, the secondary coil 104 and the primary coil 102 (drawing 12 one turn) of a number turn are arranged in same axle.
[0004] Generally, in for the headlights of an automobile, the high-pressure transformer for metal halide lamp lighting needs the high voltage of 20kV - 30kV especially. In the high-pressure transformer treating such a high voltage, if the applied voltage per one turn of a secondary coil is taken, since a 100V - number 100V thing electrical potential difference will be added, the consideration according to rank is required for the coil. Otherwise, it is because discharge is produced between adjoining coils. furthermore, the transformer of the above-mentioned application -- immediately after starting -- max -- since the current of 5A ** flows, the above-mentioned secondary coil needs a suitable gross area. namely, a thick conductor -- or the parallel connection of a thin conductor is needed.
[0005] In the conventional techniques including JP,8-130127,A, the secondary coil of about one layer was first given to the perimeter of said cylindrical core 105 by regular winding according to such a design-situation, the 2nd secondary coil was given like the periphery, and the low voltage edges of both coils and high-pressure edges were connected, respectively, and similarly, the 3rd secondary coil was given to the periphery and it had connected with it. That is, parallel connection of two or more coils wound in same axle was carried out, and it was considering as the secondary coil 104.
[0006] If a conductor with the thick cross section is temporarily used in order to secure the above-mentioned current capacity with one coil, in order to secure number of turns required to obtain the high voltage, it considers as the big transformer of an appearance, or the risk of the discharge between lines of a coil must be committed and a lap winding must be carried out. Therefore, such an unreal approach was not taken but the technique of the above parallel connection is adopted conventionally.
[0007] In the conventional techniques including JP,8-130127,A, since the secondary coil was wound in same axle and was carrying out parallel connection, the coil arranged at the periphery side requires long line length as compared with the coil wound more inside. For this reason, a wirewound resistor becomes large, so that it is on a periphery side. Consequently, if the each secondary coil by which parallel connection was carried out was pulled with the imbalance of resistance, it had also become the cause which spoils dependability.
[0008] Moreover, it was not avoided with two or more coils wound in same axle that an appearance becomes thick. Moreover, since the coil of the outermost periphery would approach most other components and members of the high-pressure transformer circumference at coincidence, it had resulted in being easy to produce unusual discharge accident among these components and high-pressure transformers, namely, spoiling dependability. Moreover, it was also unescapable to have become the big transformer of back

quantity.
[0009] Furthermore, every time leakage of magnetic flux was remarkable and pulled conventionally since it was the structure using one cylindrical core 105 as shown in drawing 12 , it had the problem of that it is easy to be influenced of a noise, being easy to emit a noise.
[0010]
[Problem(s) to be Solved by the Invention] Therefore, in order to avoid the line discharge accident of the secondary coil of ** high-pressure transformer, the coil parts of the technical problem which this invention tends to solve which this secondary coil approaches are equipotential. Or be the arrangement whose approaching coil parts do not produce the big potential difference.
** Two or more secondary coils by which parallel connection was carried out are similar structures mutually. That is, it is the coil of the diameter of said and is the coil which consists of a coil of ** length.
** It is the configuration of a magnetic circuit being formed with the magnetic material of high resistance [a main magnetic path], and arrangement of the magnetic material of high resistance having less magnetic reluctance than what was formed with at least one cylindrical core, namely, approaching a closed magnetic circuit. It is the configuration which controlled leakage of magnetic flux by this.
[0011] ** It is the structure excellent in the safety about discharge accident.
** It is the easy structure of a coil activity and transformer assembly operation.
** The small transformer of back quantity can be offered. It is ****.
[0012]
[Means for Solving the Problem] In order to solve an above-mentioned technical problem, artificers result in the invention in this application wholeheartedly as a result of research. That is, the 1st invention is the high-pressure transformer constituted so that two or more secondary coils which share the common magnetic circuit arranged in a mutually different location might serve as parallel connection.
[0013] Moreover, two or more secondary coils arranged in the location where the 2nd invention differs mutually are the high-pressure transformers constituted so that the low-voltage edge and the high-pressure edge to which each low-voltage edges of two or more of these secondary coils were connected to, and each high-pressure edges of two or more of these secondary coils were connected to, and the above was connected might serve as a secondary output terminal while sharing the magnetic flux produced with the primary coil.
[0014] Moreover, two or more secondary coils which share the magnetic flux which produced the 3rd invention with the primary coil are high-pressure transformers arranged so that the low voltage edges of each secondary coil may approach and the high-pressure edges of each secondary coil may be approaching.
[0015] Moreover, two or more secondary coils which share the magnetic flux which produced the 4th invention with the primary coil are high-pressure transformers given in either of the 1-3rd invention from which the winding direction of an adjoining secondary coil constituted at least one place so that it might become reverse mutually.
[0016] Moreover, two or more secondary coils which share the magnetic flux which produced the 5th invention with the primary coil are high-pressure transformers given in either of the 1-4th invention constituted so that it might become monolayer regular winding respectively.
[0017] Moreover, two or more secondary coils which share the magnetic flux which produced the 6th invention with the primary coil are high-pressure transformers given in either of the 1-4th invention constituted so that it might become the multilayer structure of monolayer regular winding.
[0018] Moreover, two or more secondary coils which share the magnetic flux which produced the 7th invention with the primary coil are high-pressure transformers given in either of the 1-6th invention which it was respectively wound around the coil bobbin and was constituted.
[0019] Moreover, the 8th invention is a high-pressure transformer given in either of the 1-7th invention in which the main magnetic circuit was formed by the software ferrite core.
[0020] Moreover, the 9th invention is a high-pressure transformer given in either of the 1-8th invention in which the main magnetic circuit was formed by the NiZn system ferrite core.
[0021] Moreover, the 10th invention is a high-pressure transformer given in either of the 1-8th invention in which the main magnetic circuit was formed by the NiCuZn system ferrite core.
[0022] Moreover, the 11th invention is a high-pressure transformer given in either of the 1-8th invention in which the main magnetic circuit was formed by the MgZn ferrite core or the MnMgZn ferrite core.
[0023] Moreover, the 12th invention is a high-pressure transformer given in either of the 1-11th invention in which the main magnetic circuit was formed by the RO character type software ferrite core.
[0024] Moreover, the 13th invention is a high-pressure transformer given in either of the 1-11th invention in

which the main magnetic circuit was formed by the software ferrite core of two or more U character molds.
[0025] Moreover, the 14th invention is a high-pressure transformer given in either of the 1-11th invention in which the main magnetic circuit was formed by the software ferrite core of two or more EE molds.
[0026] Moreover, the 15th invention is a high-pressure transformer given in either of the 1-11th invention in which the main magnetic circuit was formed by the software ferrite core of one U character mold or an easy mold.
[0027] Moreover, the 16th invention is a high-pressure transformer given in either of the 1-11th invention in which the main magnetic circuit was formed by the L character mold or the I-shaped software ferrite core.
[0028] Moreover, the 17th invention is a high-pressure transformer given in either of the 1-11th invention in which the main magnetic circuit was formed combining two or more kinds in a L character mold, a T character mold, and an I-shaped software ferrite core.
[0029] Moreover, the 18th invention is a high-pressure transformer given in either of the 1-11th invention in which the main magnetic circuit was formed by the software ferrite core of UI mold or EI mold.
[0030] Moreover, while, as for the 19th invention, a main magnetic circuit is formed by the software ferrite core, it is a high-pressure transformer given in either of the 1-18th invention in which this a part of soft ferrite was formed so that the cross section of a magnetic path might turn into 2/3 or less area of the average cross section.
[0031] moreover, the 20th invention -- the coil of a primary coil -- the field -- mainly -- the above-mentioned cross section -- smallness -- it is a high-pressure transformer given in the 19th invention arranged so that it may be impressed by the part.
[0032] Moreover, the 21st invention is a high-pressure transformer given in either of the 1-20th invention which the high-pressure transformer was laid under the insulating resin, and was applied to the transformer for high-pressure generating for metal halide lamps.
[0033]
[Embodiment of the Invention] The invention in this application is the high-pressure transformer by which parallel connection of two or more secondary coils which share the common magnetic circuit arranged in a mutually different location was carried out.
[0034] In this parallel connection circuit, the high-pressure edges of a secondary coil and low voltage edges are connected. If this is made reverse, since it will become series connection, effectiveness of this invention cannot be done so.
[0035] Furthermore, it arranges and two or more above-mentioned secondary coils are arranged so that the potential of an opposite part may gather, they connect high-pressure edges and low voltage edges, and make them the output terminal of a high-pressure edge, and the output terminal of a low voltage edge, respectively so that it may become abbreviation juxtaposition in ******. Here, it is not necessary to restrict connection of two or more secondary coils to the above-mentioned both ends. That is, since all the parts that counter are set up equipotential, a problem does not have adding connection by the midpoint in any way, either. It is also possible to follow, for example, to set ground potential as the location of arbitration.
[0036] It is good to make reverse mutually the coil winding direction of the two above-mentioned secondary coils which carries out opposite as a means for arranging the above and two or more secondary coils to juxtaposition, and arranging the potential of the opposite section, and combining two secondary coils which counter by one magnetic path. However, when the secondary coil has been arranged to three or more piece juxtaposition, a secondary coil may be arranged so that the winding direction of the coil which counters may become the same on association of a magnetic path.
[0037] Two or more coils which share a magnetic path mutually in same axle are ****(ed) with one coil, and, naturally considering arrangement of other coils which share a magnetic path between another location as arrangement of the invention in this application also does similar effectiveness so. However, the case where the each secondary coil serves as monolayer regular winding, respectively demonstrates the effectiveness of the invention in this application most directly. In order to perform such a coil efficiently, it is good to prepare the bobbin of a **** coil and to give this a coil.
[0038] Two or more above-mentioned secondary coils are arranged around a software ferrite core, and the secondary coils on the magnetic circuit formed by this soft ferrite are combined magnetically. A magnetic circuit here does not need to be single, for example, it may consist of two magnetic circuits, and two secondary coils each may be arranged each in one magnetic circuit. Moreover, it does not interfere at all that a part of two magnetic circuits are sharing one York, either.
[0039] As for a software ferrite core, it is desirable that it is the ingredient of high resistance, and it has a NiZn system, a NiCuZn system, a MgZn system, and a MnMgZn system ferrite as such an ingredient. These

ferrites contain in a component what contained oxides, such as Ti, Cr, aluminum, Sn, Li, Co, Pb, Bi, V, Si, and calcium, as an additive or a permutation component. Moreover, these soft ferrites have the desirable soft ferrite in consideration of generation of heat of low loss.

[0040] The configuration of a software ferrite core is a RO character type soft ferrite. A RO character type may be an abbreviation square and may be a rectangle.

[0041] Moreover, a cross-section configuration is good in the configuration of the arbitration containing circular, an ellipse, a square shape, etc. The configuration which combined these various configurations, for example, an ellipse and a hemicycle are sufficient as and has a notch in a part is sufficient. Furthermore, a cross-section configuration may combine so-called difference mutually by the partial part. For example, two sides may be the circular cross sections which counter, and two adjoining sides may be the cross sections of a square shape. An anomaly is sufficient. The cross-section configuration described here is the same also in the software ferrite core of other configurations described below.

[0042] An above-mentioned RO character type software ferrite core may be constituted combining two or more software ferrite cores. For example, you may be UU mold and UI mold. On a design, even if such a combination core is the combination accompanied by a gap, it does not interfere.

[0043] Otherwise as a configuration of a software ferrite core, you may be EE mold core. It is the same even if it is EI mold. The inside leg was a round cross-section configuration, and it was already said that the biped section may be the cross-section configuration of a square shape. Suitably, the gap section may be arranged.

[0044] The configuration of a software ferrite core may be the core of one U character mold or E mold. Moreover, you may be the core arranged combining two U character mold cores so that it may become an abbreviation easy mold.

[0045] The configuration of a software ferrite core may be arranged combining suitably a total of one or more sorts [two or more] in the core of a L character mold, an I-shaped core, and the core of a T character mold. Most directly, a secondary coil may be arranged to two cylindrical cores, respectively, and you may constitute so that these two cylindrical cores may form one magnetic path.

[0046] A part of the software ferrite core may be thinly or narrow. Furthermore, a primary coil may be arranged into the part which became thinly or narrow. moreover, the above -- the cross section of the part which became thinly or narrow is 2/3 or less [of the average cross section of other parts]. Furthermore, it is 1/2 or less, and is 1/4 or less most desirably.

[0047] The high-pressure transformer constituted as mentioned above may be embedded into insulating resin, and may be applied to the transformer for high-pressure generating of a metal halide lamp. The above-mentioned insulating resin may be resin of an epoxy system. Moreover, another resin may be used for the winding frame and flange of a coil. For example, phenol resin and Noryl resin may be used for the winding frames of a coil. Moreover, into the case made of polybutylene terephthalate (PBT) resin, after the above-mentioned insulating resin contains a high-pressure transformer, it may be filled up with it into a case.

[0048] Moreover, the above-mentioned metal halide lamp may be an object for metal halide lamps for the headlights of an automobile. Furthermore, if a metal halide lamp is a high intensity discharge lamp (HID), it is also applicable to a mercury lamp.

[0049] In order for here to explain the gestalt of operation of this invention concretely including the principle of operation, a core explains the case where UU mold and the number of secondary coils are two pieces, using drawing 10 and drawing 11 . Drawing 10 is the simple plot plan showing the relation between the magnetic circuit of the high-pressure transformer of this invention, and coil arrangement. Moreover, drawing 11 is the connection circuit diagram of each terminal of drawing 10 .

[0050] A RO character type core is constituted by U mold core 25, as for the primary coil which is an input side, 1 turn coil 21 and 1 turn coil 22 are used, and the secondary coil of an output side uses a coil 23 and a coil 24. As for a primary coil, the connection method of the high-pressure transformer of this invention carries out series connection of 1 turn coil 21 and the 1 turn coil 22, as shown in drawing 11 , and input voltage Vin is substantially impressed as a coil of 2 turns. Moreover, when, as for a secondary coil, a coil 23 and a coil 24 look at each coil alone by the winding directions differing, respectively, a coil 23 is covered over terminal ** from terminal **, an electrical potential difference rises, a coil 24 is covered over terminal ** from terminal **, and an electrical potential difference descends.

[0051] However, as shown in drawing 11 , a secondary coil constitutes a coil 23 and a coil 24 as a juxtaposition coil. The coil a point which the coil 23 of a secondary coil and a coil 24 counter, and suits has the respectively same electrical potential difference, and has the same electrical-potential-difference value also at a coil b point. That is, in the coil part which the minimum distance of a coil 23 and a coil 24 counters, and suits, the potential difference could use the right-and-left pleuropodium of the RO character type core

which comes to combine near and U mold core 25 with zero, could use the volume of a RO character type core effectively, and made the miniaturization possible compared with the former.
[0052] Moreover, by making the coil 23 of a secondary coil, and a coil 24 into monolayer regular winding Even if the pressure-up electrical-potential-difference value of a secondary coil is dozens of kV, the distance of the volume start of a coil and a volume end is separated enough. Although it twists that discharge takes place and is not illustrating in addition since the coil opposite section of the minimum distance of the secondary coil 23 and a coil 24 has the potential difference close to zero, moreover, coils 21, 22, 23, and 24 It has wound around the bobbin which consists of insulating resin, the insulation with a core is achieved, and discharge by the potential difference is not generated between a coil and a core.
[0053]
[Example] The 1st example of this invention is shown in drawing 3 from drawing 1 . Constituting a RO character type core combining U mold core 5 of a NiCuZn system ferrite, a coil is wound around the bobbin 6 which consists of phenol resin of insulating resin, is built into said RO character type core, and serves as a transformer. A bobbin 6 has the hollow hole 7 for pleuropodium insertion of a RO character type core, flanges 8 and 9 are given, it has the flat part 10 for core maintenance in both ends, one flange 8 fully has thickness and the primary coil which consists of a 1 turn coil 1 or a 1 turn coil 2 is attached in this flange 8.
[0054] Moreover, between the flange 8-flanges 9, the secondary coil 3 or the secondary coil 4 is wound by monolayer regular winding. Moreover, the endpoint of the coils 1 and 2 of one above-mentioned turn plays a role of a terminal, and, as for the terminals 11 and 12 located in the inferior surface of tongue of said bobbin 6, is tucked up by the terminals 13 and 14 with which the secondary coils 3 and 4 were given to the bobbin 6. In addition, although the bobbin 6 which wound said coil is built into the pleuropodium of a RO character type core, respectively, the winding direction of the secondary coils 3 and 4 is constituted by reverse, respectively.
[0055] As the 2nd example, the quality of the material of the software ferrite core of the 1st example was transposed to the NiZn system ferrite, the MgZn ferrite, and the MnMgZn ferrite, and the result as above-mentioned effectiveness with same place and all that were carried out by other configurations being the same was obtained. When a MgZn system ferrite and a MnMgZn system ferrite were adopted especially, the price of a ferrite core was able to be reduced remarkably.
[0056] Moreover, the same effectiveness was acquired, even if it replaced with UU mold core of the 1st example and used UI mold core as the 3rd example. Furthermore, the same effectiveness was acquired, even if it replaced with the core of UU mold of the 1st example and adopted the RO character type core which is not divided. Moreover, the same effectiveness was acquired also about the various configurations which combined the core of U mold, an L type, and an I-beam. The example of combination of the core is shown in drawing 4 .
[0057] the place which drawing 5 prepared 2 sets of transformers in the 1st example, has arranged it to bilateral symmetry, and carried out parallel connection of the four secondary coils -- though it was natural, the completely same effectiveness was acquired, in addition current capacity became twice. In addition, it is not necessary to connect altogether 1 turn coils 1 and 2 which constitute a primary coil, and is good at the connection according to the engine performance.
[0058] Drawing 6 used the configuration of a software ferrite core as EE mold 15 core, and used the transformer in the 1st example as the secondary coil 17 of ****** at the both-sides foot, the inside foot was used as the secondary coil 18 of ******, these coils were connected to juxtaposition, and when the primary coil 16 was formed in the low voltage edge approach of the inside leg, the same effectiveness as an example 1 was acquired. In addition, current capacity has improved 1.5 times by having become 3 juxtaposition coil.
[0059] Moreover, two layers of things made into monolayer regular winding were formed in piles, the same effectiveness as the place and example 1 which were replaced with what carried out parallel connection of this was acquired, and the coil 18 of the inside [this] leg has improved the whole current capacity twice. Said two-layer monolayer regular winding can constitute the two-layer pile of monolayer regular winding easily by using the parallel lines 19 with which two wire rods were formed in one, as shown in drawing 7 . Of course, the multilayer structure of monolayer regular winding can constitute easily by using three or more parallel lines.
[0060] In the configuration of the software ferrite core which has such an inside foot and a both-sides foot, when the core of what used the configuration of this software ferrite core as E mold, the thing used as EI mold and an I-beam, U mold, T mold, and an L type was transposed to **, such as a combination thing, and was carried out, the same effectiveness as an example 1 was acquired. Arrangement and the configuration of this software ferrite core are shown in drawing 8 .

[0061] As other examples, the surrounding core of the primary input-side coil of the 1st example was made thin by dicing, what made the diameter of winding of a primary coil small according to this was prepared, and when others considered as the same configuration as an example 1, they did so the same effectiveness as an example 1. Since this points out that it is conversely possible relatively to make the ferrite core of the secondary coil circumference thick, if it is possible to make the inductance of a secondary coil increase and it pulls, it shows that the function as a choke coil at the time of stationary continuation lighting can be raised.
[0062] If this is two thirds of below the cross sections as compared with the cross section of other parts, since the coil of a primary coil does not project the cross section of the part made thin by the above-mentioned dicing, a miniaturization can be attained. If it is one half of the cross sections, in addition to the above-mentioned effectiveness, the fall of output voltage is minute. When it was the 1/4 or less cross section, the magnetic-saturation phenomenon at the time of high current impression was able to be seen, the inductance of the secondary coil after immediately after starting could be made to have been able to decrease sharply, without sacrificing a starting performance, and loss at the time of steady operation was able to be ****(ed) by this.
[0063] it operated satisfactory from the place applied to the metal halide lamp for the headlights of an automobile, and starting to steady operation, each examples including the 1st example were also boiled and set to the reliability trial, for example, a repeat starting test, the heat cycle test, etc., and sufficient results were obtained. The important section of a metal halide lamp lighting circuit is shown in drawing 9 .
[Effect of the Invention] The following effectiveness is acquired by adopting the configuration of this invention.
** The coil parts which the secondary coil of a high-pressure transformer approaches become that there is no accident which discharges thru/or short-circuits.
** Since the overall diameter of the secondary coil of a high-pressure transformer was made small, it has contributed to thin shape-ization of an entire component.
** Since the overall diameter of the secondary coil of a high-pressure transformer was made small, there is very little discharge accident to circumference components, and the high-pressure transformer which has high dependability can be offered.
** Since a magnetic circuit was a configuration near a closed magnetic circuit or a closed magnetic circuit, there was little interference of a circumference circuit etc. and it became easy to noise cope with it.
** The direct current resistance of two or more secondary coils was able to be arranged easily. Moreover, the useless part was able to be made small on the dependability degradation factor accompanying these resistance being imbalanced, or the design to the minimum. For example, the borderline on a design was able to be pulled up by that there is no coil which is especially easy to damage by fire, there being no coil especially with few inductances, etc.
** Since the magnetic reluctance of a magnetic circuit went down, the big inductance could be secured and, as a result, the whole miniaturization was attained.
** Manufacture of a secondary coil could perform the thing of high quality so much easily, and productivity and its dependability improved by leaps and bounds.

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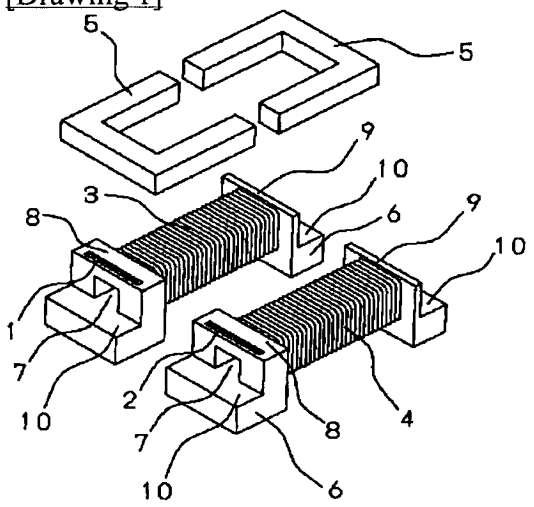
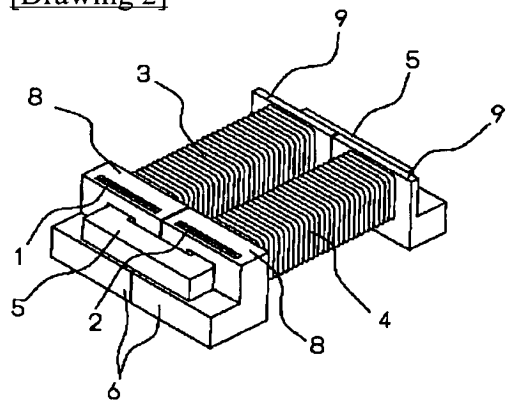
DRAWINGS

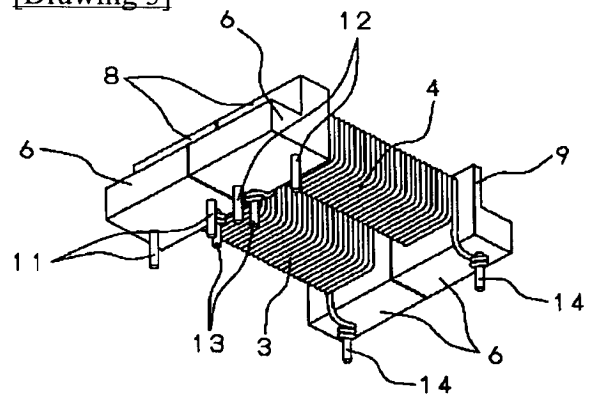
[Drawing 1]



[Drawing 2]



[Drawing 3]



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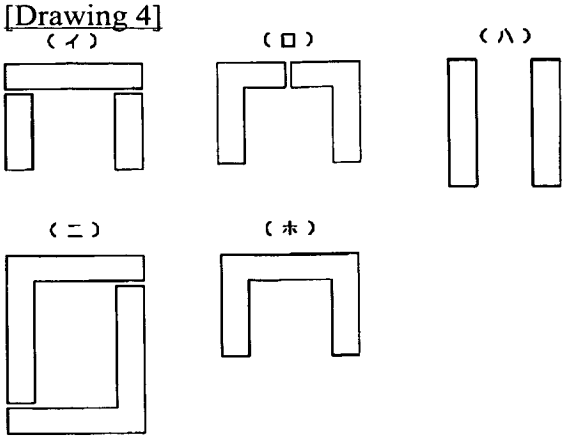

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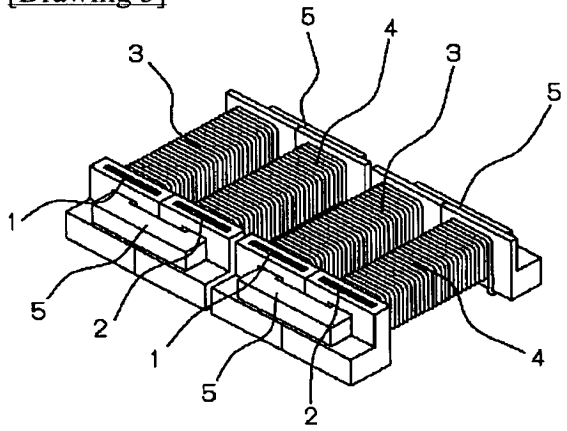

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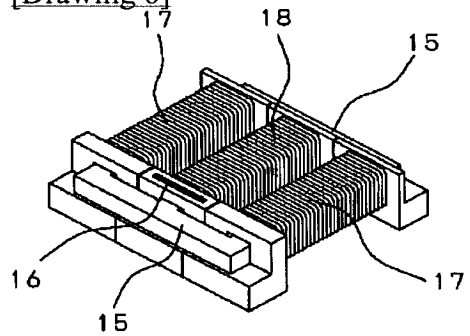

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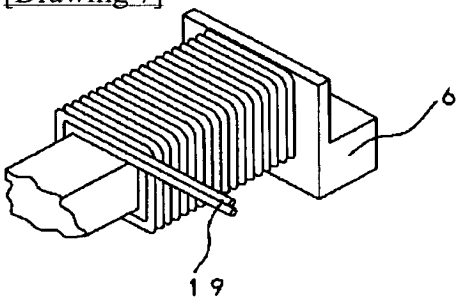

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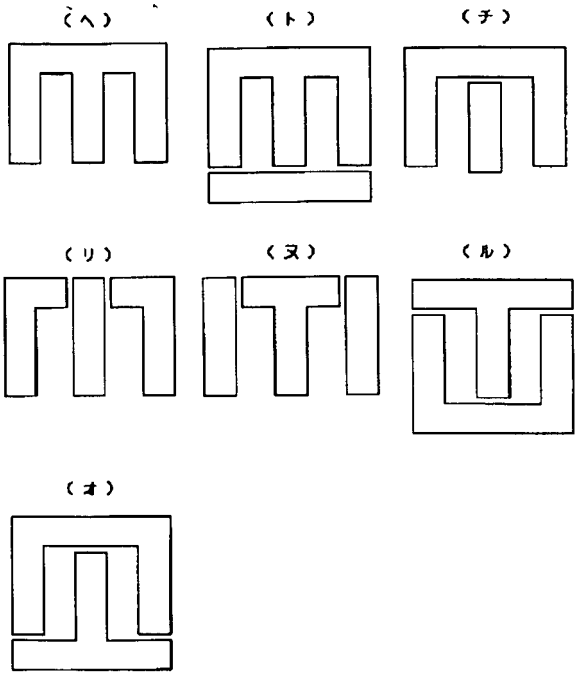

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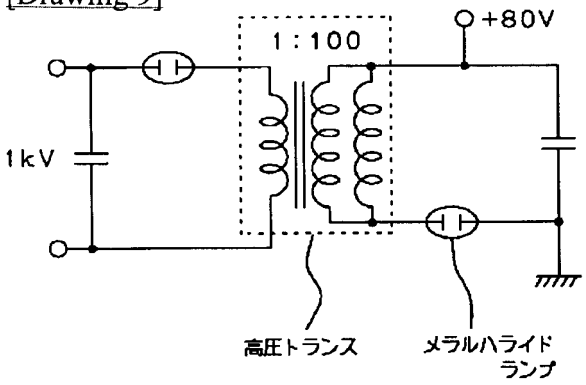

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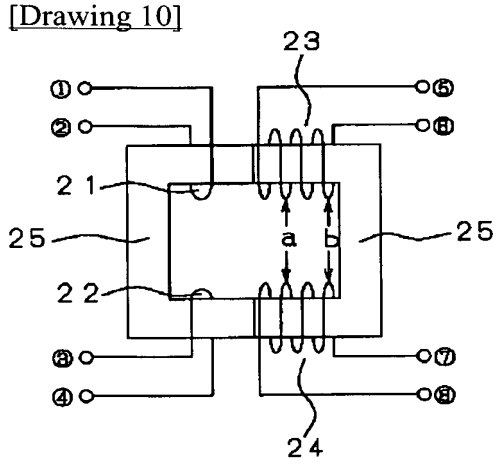

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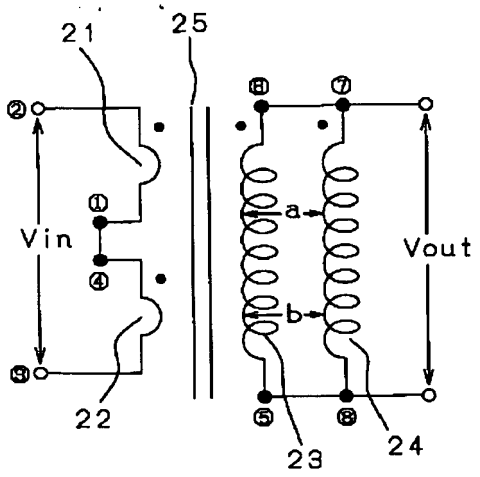

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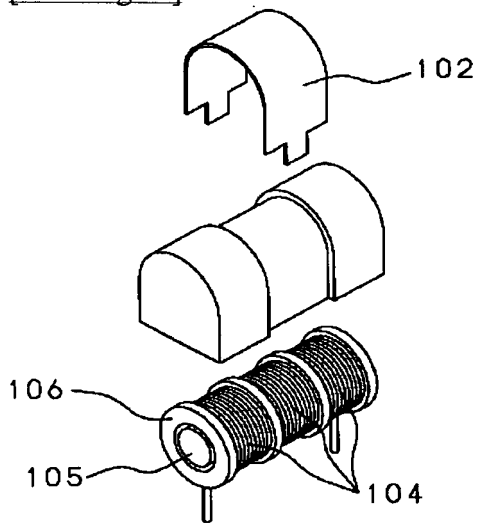

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